

direction to the bullet. Various kinds of bullets were used for these photographs, some of aluminium, in

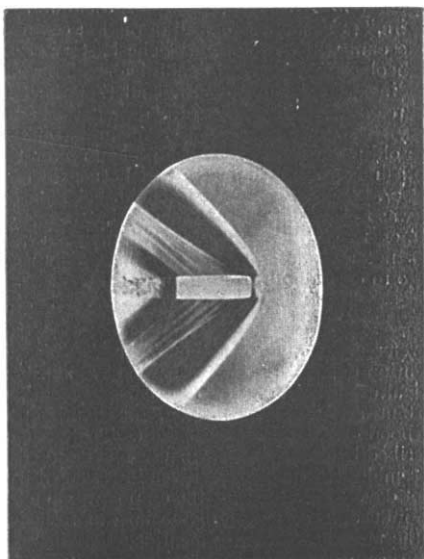


FIG. 1.—Photograph of a bullet in motion.

order to obtain a greater velocity, which varied from 750 to 3000 feet per second; the former being the

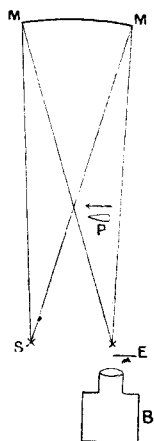


FIG. 2.—Arrangement for the photography of a bullet in motion.

average velocity of a pistol shot, the latter of a magazine rifle.

SIR B. W. RICHARDSON, F.R.S.

SIR BENJAMIN WARD RICHARDSON, whose death we regretfully announce, will be remembered more widely on account of his many lucid contributions to popular medical literature, and as an attractive lecturer on scientific subjects, than for his additions to medical knowledge. His great and versatile talents do not, however, diminish his claims to distinction as a physician of much originality of mind and a careful investigator; and these are the qualities which has earned for him the high esteem of men of science.

Sir Benjamin Richardson was born at Somerby, in the county of Leicester, in 1828, and graduated in medicine at the University of St. Andrews in 1854. After a short experience as general practitioner, he removed to London in order to devote himself to medical

and physiological research. In 1856 he obtained the Astley Cooper Triennial prize of £300 for the best essay on the coagulation of the blood, and from that time forward his life was one of incessant professional and literary activity. He devoted much time to the investigation of the action of anæsthetics, and to an endeavour to discover some agent which should be superior to chloroform; but, of the many compounds with which he experimented, only one, the bichloride of methylene, has in any way held its ground, and that only in the hands of a few administrators. This inquiry led him to the discovery in connection with which his name is best known, viz. the application of ether spray for the local abolition of pain in surgical operations. Among the many other subjects which he advanced by experimental study are: the restoration of life after various forms of apparent death; methods of killing animals without the infliction of pain; effects of electricity upon animal life; and alcohol in relation to its action on man. He also introduced into medical and surgical practice many valuable preparations, among others the ethylate of sodium; and his investigations largely contributed to the attainment of a working knowledge of the properties and uses of nitrate of amyl. In 1864, "in recognition of his various contributions to science and medicine," he was presented, by six hundred members of his profession, with a testimonial consisting of a microscope by Ross and one thousand guineas.

Sir Benjamin Richardson's contributions to magazines, journals and transactions are innumerable. He originated and for a time edited the *Journal of Public Health*, afterwards called the *Social Science Review*, and for the last twelve years he has maintained a quarterly medical journal, the *Asclepiad*, of about 150 pages, every line of which has been of his own composition. On the very day of his fatal seizure he had completed the revision of the proofs of a new book entitled "Memories and Ideals." He was elected a Fellow of the Royal Society in 1867, and was the Croonian lecturer in 1873. He received the honour of knighthood in 1893, and, among other distinctions, was a Fellow of the Society of Antiquaries, of the Royal College of Physicians of London, and of the Faculty of Physicians and Surgeons of Glasgow. He was M.A., M.D., and LL.D. of St. Andrews; Fothergillian gold medallist; and past President of the Medical Society of London.

Thus for more than forty years Sir Benjamin Richardson devoted his energies to the solution of the question, "How shall pain, disease—nay, death itself as an enemy—be swept from the earth, as vanquished enemies of every race?" By his efforts to relieve pain and remove the pangs of death, and for the attention which he gave to other questions connected with his noble profession, he claims the gratitude of humanity.

Sir Benjamin Richardson leaves a widow and two sons and a daughter.

NOTES.

A MONUMENT in memory of Father Secchi, the former Director of the Collegio Romano Observatory, has been erected at Reggio (Emilia), where he was born. The sum of 78,000 francs was publicly subscribed for this purpose.

THE *British Medical Journal* states that the long-standing question of providing a statue to Darwin in his native town (Shrewsbury) has been settled by the Shropshire Horticultural Society undertaking to defray the entire cost, estimated at from £1000 to £1200.

THE death is announced of Dr. F. Saccardo, professor of natural sciences at the school of viticulture at Avellino, a recognised authority on the diseases of the vine, and a writer on lichenology.

THE competition of horseless carriages for the prizes, amounting to 1100 guineas, offered by the *Engineer*, will take place at the Crystal Palace next May. The trials were to have taken place during the past summer, but in deference to the wishes of intending competitors it was postponed until next year.

AN application of Röntgen rays to palæontology is recorded in the *British Medical Journal*. M. Lemoine, of Rheims, recently showed to the Paris Biological Society the *clichés* of Röntgen photographs of fossils embedded in the chalk strata of Rheims. M. Lemoine is reported to have thus photographed a series of fossil birds, reptiles, and mammals.

WE regret to announce the deaths of the following men of science abroad:—Dr. E. A. G. Baumann, Professor of Physiological Chemistry in the University of Freiburg; Dr. R. Kerry, Director of the Bacteriological Institute of the Agricultural Ministry at Vienna; Dr. Eugen Sell, Extraordinary Professor of Chemistry in the University of Berlin; and Dr. S. Cornelius, Titular Professor of Physics in the University of Halle.

THE sixtieth anniversary of Prof. James Hall's public services to science, as State Geologist of New York, was celebrated by a special meeting at Buffalo, during the recent assembly of the American Association for the Advancement of Science. A full report of the appreciative remarks made on that occasion by Prof. Joseph Le Conte, on behalf of the Geological Society of America, with the addresses and papers presented as tribute to the Nestor of palæontology and the founder of American Stratigraphy, appears in the issue of *Science* for November 13.

WE learn from the *Times* that Mr. David Robertson, a well-known Cumbræ naturalist, died at Millport on the 20th inst., at the age of ninety. He was a native of Glasgow, but for the last forty years he lived at Millport, and devoted much attention to the study of the natural history of the west of Scotland. In company with Dr. John Murray, of the *Challenger* expedition, he dredged the greater part of the Firth of Clyde; and largely through Dr. Robertson's efforts the foundation-stone of a permanent marine station was lately laid. Two years ago the University of Glasgow conferred on him the degree of LL.D.

WE regret to announce the sudden death of Mr. Arthur Dowsett at his residence, Castle Hill House, Reading, on Friday morning, the 6th inst. Mr. Dowsett was well known to a large circle of friends as an enthusiastic lover of natural history, and he had made large and valuable collections of ornithological and entomological specimens. He was one of the founders of the Reading Natural History Society, of which he acted as president from 1882 until the time of his death. He was scarcely ever absent from one of the Society's indoor meetings, and had greatly endeared himself to all the members by his kindly genial disposition and unflinching readiness to do anything to further their aims and objects. He was a Fellow of the Zoological and Entomological Societies.

IN his presidential address to the Royal Statistical Society, last week, Mr. John Biddulph Martin counted as enemies to statistical science the laborious compilers of figures which were of no value when obtained, and those who aimed at minute accuracy in figures when it was impossible to estimate, save approximately. The physical investigator who expresses his results to four or five places of decimals when he cannot determine one of the factors within a probable error of one per cent., comes in this category. It was through extravagances of this kind that M. Thiers defined statistics as the art of stating in precise terms things which one does not know. Dealing with the graphic method of expressing statistical totals by geometrical figures, accompanied in some

cases by the employment of colours, Mr. Martin regretted that the use of the method, which had sprung up automatically, had not been developed on any conventional lines. Were the employment of particular graphic forms invariably applied to the exposition of the same phenomena, and if this conventional agreement could be made international, the interpretation of statistics graphically presented would be vastly facilitated.

IN the *Mathematical Gazette* for October, Mr. R. F. Muirhead points out that Newton's law of impact as stated in text-books does not apply to cases when three or more bodies are in simultaneous collision, and, moreover, it appears that the problem is not a determinate one unless some further assumption is made. Thus in the case of three spheres colliding together, if the collisions are not perfectly simultaneous, the final velocities of separation depend on the order in which the two first collisions take place. It would be interesting to test this last result experimentally.

SEPARATE records of the rainfall in the day and night are of much greater value to medical men than a knowledge of the mean rainfall of each month. Mr. W. W. Wagstaffe points out the advisability of keeping such records separately; and he gives, in the *Lancet*, the results of ten years' observations of the relative fall of rain in the day and night at Sevenoaks, taking the day to be from 10 a.m. to sunset. The mean annual rainfall for the day was 40 inches, and for the night 60 inches. An examination of his records shows that in winter the nights are much wetter than the days, and in spring and autumn they are also wetter, but the difference is less marked. In summer the excess of rain at night is found to be much less marked than in the other seasons.

A SHORT time ago Mr. J. H. Hart mentioned, in the *Bulletin* of miscellaneous information published at the Royal Botanic Gardens, Trinidad, that there was evidence of the attack of fungi on timber or trees previous to the destruction of the wood by Termitide. He returns to the subject in the October *Bulletin*, wherein he states that the mycelium of a fungus could be readily traced in all parts of the tissue of a number of specimens attacked by Termites. That it is really a fungus which attacks the wood, the experiments at Trinidad prove conclusively, and that Termites follow the attack is also clearly shown. The only doubtful point is whether the wood ants do at any time or in any case attack sound timber. So far as observations at present go, it seems that the primary cause of the destruction of wood by Termites is the mycelium of some fungus.

TO the University of Illinois belongs the honour of having established, under the direction of Prof. S. A. Forbes, the first fresh-water University Biological Station in America with an adequate equipment. The centre of operations is a commodious boat, having a laboratory in which fifteen workers can be accommodated. This floating laboratory was moored at Quiver Lake, two miles north of Havana, during the past summer. How very attractive this district is, both from a scenic point of view, and from the standpoint of the naturalist engaged in investigation, may be gathered from an illustrated article in *The Illini* of November 6. Quiver Lake is the home of myriads of water-fowl; it abounds in vegetation, and the microscopical life of the water is equally abundant and varied. It seems to be a paradise for students of natural history; so we are not surprised that the full complement of investigators occupied the boat during the months of June, July, and August, and made observations of value to biological science.

THE technical papers are almost unanimous in their adverse criticisms of the recent motor car show. *Engineering* says: "To the thoughtful engineer, last week's saturnalia could not have

been otherwise than a melancholy spectacle. . . . The proceedings only further illustrated what was pretty well known before—that at present the science of designing mechanical road carriages is in a very elementary stage, and much remains to be done before it can be claimed that a motor car has been produced fit to take its place on the highway as a commercially successful carriage, and one which can be relied upon to do general work in competition with horse-drawn vehicles.” The *Electrician* remarks: “The adaption of electricity to the requirements of vehicular traffic is, in our opinion, still in the embryonic stage; and that being so, it is decidedly premature to float public companies on the basis of mere estimated profits. There is so very little to go upon, electrically speaking, and that little is so very discouraging, that no sober-minded engineer would care to countenance an appeal for funds at the present juncture, and pledge his reputation that with ordinary care the investment would, within a reasonable period, prove sufficiently remunerative to compensate for the risk run.” The *Electrical Review* holds the same opinion, and shows that the scheme for using accumulator-driven cabs in London cannot be a success even with the accumulators of “special patented design” referred to by company promoters. “It behoves electrical engineers to seriously and conscientiously study the question,” says our contemporary, “in hopes of some day finding the requisite and proper electric vehicle, as distinguished from the mere car of the promoting ‘Juggernaut’ whose pathway is strewn with the wasted gold of a confiding and credulous public.”

TAILED men have again turned up. Six years ago, in the course of a visit to the Indo-Chinese region, between 11° and 12° lat. and 104° and 106° long., M. Paul d'Enjoy captured an individual of the Moï race, who had climbed a large tree to gather honey. In descending, he applied the sole of his feet to the bark; in fact, he climbed like a monkey. To the surprise of the author and his Annamite companions, their prisoner had a caudal appendage. He conversed with them, swaggered in his savage pride, and showed that he was more wily than a Mongolian, which, as the author adds, is, however, a very difficult matter. M. d'Enjoy saw the common dwelling of the tribe to which this man belonged, but the other people had fled; it consisted of a long, narrow, tunnel-like hut made of dry leaves. Several polished stones, bamboo pipes, copper bracelets and bead necklaces were found inside; these had doubtless been obtained from the Annamites of the frontier. The Moï used barbed arrows which are anointed with a black sirupy violent poison. The tail is not their only peculiarity. All the Moïs whom M. d'Enjoy has seen in the settlements have very accentuated ankle-bones, looking like the spurs of a cock. All the neighbouring nations treat them as brutes, and destroy these remarkable people, who, the author believes, to have occupied primitively the whole Indo-Chinese Peninsula. The Moï skulls described by MM. Verneau and Zaborowski were certainly by no means those of pure natives: they were taken from graves; but the settled Moï burn their dead, and place the ashes in bamboo pots, or in ratan baskets, considering their spirits as protective divinities. As this somewhat sensational account has been published by our esteemed contemporary *l'Anthropologie* (Tome vii., No. 5), we must treat it with respect; and we hope it will not be long before these tailed men are carefully described by a trained scientific observer.

A VERY remarkable archaeological find was made this summer near Perm, on the hilly left bank of the Kama, at the village Glyadenovo. In June last, M. Sergueeff, a member of the Perm Archives Committee, discovered at that spot traces of an earthen fort and of an extensive burial-place of the old, still problematic inhabitants of old Russia, the so-called Chuds.

Systematic excavations having now been made in the five feet thick layer of bone-ashes of that burial-place, perhaps the richest known collection of Chud implements was unearthed. No less than 100 earthenware vessels, and cart-loads of broken pieces of earthenware were found. These broken pieces are ornamented with all sorts of figures, giving a full insight into the life of the inhabitants. Men sitting on horseback and in small boats, nine engravings of bees and flies, fifty-nine engravings of birds, 102 of different mammals, ten of snakes, were found on that earthenware, besides three masks and one head of mammals, one big silver plate representing a man who stands on some animal, and eight smaller silver plates, 141 bronze plates, several bronze statuettes, and an immense number of rings, stars, bells, small models of sledges, thimbles, arrow-heads, hatches, knives, 390 gilded bronze pearls, fishing hooks, skulls of stags, various carnivorous animals, &c., were discovered. In short, a full picture of the life of the Chud is given by this unique collection; the only difficulty being now to find where to house it, as the Perm “Museum” is nothing but a small apartment, hired for the exhibition of some antiquities of this extremely interesting region.

THE increasing part played by reading in the life of civilised man has resulted in the wide prevalence of myopia, astigmatism, and kindred disorders. Myopia would, however, be rare if the eye were never fatigued; so a paper by Harold Griffing and S. I. Franz, in the *Psychological Review*, on the physical conditions of fatigue in reading, and the best means of avoiding it, should be of service. From their experiments the authors conclude that the size of type is the all-important condition of visual fatigue. No type less than 1.5 mm. in height should be used, the fatigue increasing rapidly even before the size becomes as small as this. The intensity of illumination is apparently of little consequence within the limits of daylight in well-lighted rooms. Very low intensities, less than from 3 to 10 candle-metres, are sources of even greater fatigue than small type, and 100 c.m. may be considered a safe limit. White light rather than yellow light should be used for artificial illumination. The form of the type is of less importance than the thickness of the letters. White paper should be used, though it is possible that the greater amount of light reflected from pure white paper may cause some fatigue. Additional “leading” or spacing between the lines is also recommended. These conclusions should be especially known to publishers of school books.

FROM the Tōkyō Mathematico-Physical Society we have received a copy of their *Kiji* (Proceedings), including papers by Prof. D. Kikuchi, on Agima's method of finding the length of an arc of a circle, and by K. Tsuruta, on the magnetisation of iron wires traversed by electric currents. The latter paper is illustrated by diagrams showing the changes which take place in the curves of magnetisation, of susceptibility and of cyclic magnetisation when currents of different strength are passed through the wire. The author finds that the effects are the same in whatever direction the current is passed through the wire, in this respect differing from a result previously obtained by Prof. C. G. Knott.

THE revival of an old controversy in a new form, in connection with the application of corpuscular and undulatory theories to cathodic rays, has led to a rather interesting mathematical investigation by Dr. A. Garbasso, published in the *Atti dei Lincei*. The author's object was to determine whether the well-known effects of an electric or magnetic field in deflecting these rays could be accounted for on the undulatory theory, and he considers particularly the effect of a uniform magnetic field in imparting to these rays a helicoidal form. The equations obtained by Dr. Garbasso seem to show that the latter phenomenon cannot be accounted for on the hypothesis of trans-

verse vibrations, at any rate if the surfaces of equal refractive index are parallel planes. Dr. Garbasso does not seem, however, to introduce any considerations of the "Hall effect" into his calculations; whether the latter phenomenon has any bearing on the question or not, is quite another matter.

DR. E. ODDONE has recently examined the seismic record of Liguria during the last century (1796-1895), in order to determine whether the frequency of earthquakes in that district is subject to any periodic laws. The record is a non-instrumental one, and the results derived from it have not therefore the same value as those obtained from a seismometric catalogue. Dr. Oddone shows that the supposed nocturnal prevalence of earthquakes is here insensible, but there is a daily period with its maximum between 6 and 7 a.m. The two halves of the century do not exhibit the same distribution of earthquakes throughout the year, and in the latter half (during which the record is most complete), earthquakes are equally numerous in the summer and winter months. They are less frequent during years of maximum solar activity, and *vice versa*, so that there appears to be a period of eleven years, and possibly also one of about twice this length.

WE have received a work on Earth Temperatures at Mustiala, by Dr. T. Homén, being part 9, vol. xxi. of the *Acta* of the Society of Sciences of Finland. The Agricultural Institute of Mustiala is situated in lat. $60^{\circ} 49' N.$, and long. $23^{\circ} 47' E.$; the observations were taken both near the Institute and at the woody district of Heinäis, about seven miles to the north, during the years 1885-94, at various depths, and are printed *in extenso*, together with monthly means and yearly extremes. They are discussed with a view to showing the influence of rainfall and snow-covering upon the temperature of the earth, and are also compared with similar observations at Pavlovsk and St. Petersburg. The first regular observations of earth temperature in Finland were made at Sodankylä during the international polar expeditions of the years 1882-4; the present work, therefore, fills an important gap in the knowledge of the natural phenomena of that country, and will, no doubt, repay the large amount of careful labour bestowed upon it.

PROF. W. H. JULIUS has devised a very neat apparatus for eliminating all small movements due to vibrations from delicate instruments, such as galvanometers, &c. Last year (in the *Wied. Ann.*, 56, p. 151) he described this method, and a note on the subject was made in these columns (*NATURE*, vol. lli. p. 578). Quite recently he has given an account of a modified form of apparatus into which instruments to be shielded from these vibrations can be placed. This apparatus consists practically of a kind of framework, suspended by three wire cords, into which the instrument to be used is placed. It is found that, under these conditions, vibrations which otherwise would have disturbed the instrument are nearly eliminated. There are, however, certain conditions to be fulfilled to reduce such vibrations to a minimum; for instance, it is advisable so to arrange the centre of gravity of the whole apparatus, with the instrument included, that this point should fall in the plane in which the three lower extremities of the wires are connected to the framework. Further, if there be any special point in the instrument in question which must be shielded from any influence or vibration—such as, for instance, the quartz or silk thread of a galvanometer—this point should also be brought into the same plane. The apparatus which Prof. Julius has devised is arranged to fulfil these requirements. It consists of three rods placed parallel to one another in triangular form, and coupled together at their extremities by two metal hoops. This framework is suspended by three metal wires, the latter extremities of which are fixed to it at three points near their middle parts, lying in a plane between two hoops, referred to above; a third hoop is placed which can slide lengthways along the three rods. It is on this that the instrument to be freed from vibrations is placed. To bring the whole

centre of gravity to a point in the plane of the three points of suspension, the framework is suspended horizontally temporarily by one of the wires; and the balance of the apparatus, with the instrument attached, is obtained by varying the position of the three weights placed near the ends of the rods for that purpose. The adjustment of that special part of the instrument which must be freed from vibration, is made by placing this, as near as possible, at the centre of gravity. To deaden any movements in the whole apparatus, three fan-shaped appendages are fixed to the hooks to which the wires are attached, and these are intended to be immersed in vessels filled with paraffin. The apparatus itself seems, from all accounts, to overcome the difficulties occasionally met in freeing delicate instruments from minute tremors. After being once accurately suspended, the chief difficulty in its adjustment is practically at an end. Supplied with the apparatus is also a small bracket, which can be fixed to the ceiling or beam, from which the apparatus can be suspended.

MR. G. C. WHIPPLE reprints from the *Technology Quarterly* (Boston, U.S.A.) an interesting paper on the growth of diatoms, especially in relation to the purity or impurity of drinking water. An abundant food supply is not the only favourable condition for the rapid increase of diatoms; temperature, the amount of light, and other conditions also influence their growth. In common with other chlorophyllaceous plants, they will not grow in the dark; while, on the other hand, bright sunlight kills them. The intensity of the light below the surface of the water being influenced by the colour of the water, diatoms are found most abundantly in light-coloured waters. Different genera, however, present differences in this respect; *Melosira* does not require so much light as *Synedra*. The weather has a marked influence on their growth. They increase most rapidly during those seasons of the year when the water is in circulation throughout the vertical. During these periods, not only is food material more abundant; the vertical currents keep the diatoms near the surface, where there is light enough to stimulate their growth, and where there is abundance of air. Some species of diatom display very strong heliotropism, moving towards the source of light.

THE two latest additions to the *Encyclopédie Scientifique des Aide-Mémoire* are:—"Les Accumulateurs électriques," by F. Loppé, and "L'Éclairage: Éclairage électrique," by Prof. J. Lefèvre. The volumes set forth clearly and well the principles which have their applications in those branches of electrical engineering expressed by the titles.

AT the Royal Victoria Hall on December 1, Dr. W. D. Halliburton, F.R.S., will lecture on "Painlessness," in commemoration of the jubilee of the discovery of anæsthetics; and on December 8, Dr. W. F. Hume will take "From the Crimea to Baku" as the subject of a discourse. A few months ago (vol. liv. p. 232) Dr. Hume contributed an account of the great oil region of Baku to these columns.

THE experiments of M. H. Bazin "upon the contraction of the liquid vein issuing from an orifice, and upon the distribution of the velocities within it," clearly advanced the knowledge of the important and difficult question of the liquid vein. The memoir, in which the investigation was described, has been translated by Mr. John C. Trautwine, and published by Messrs. John Wiley and Sons. Hydraulic engineers and mathematical physicists will be glad to have this authorised translation in a handy volume form.

MR. W. DOBERCK, the Director of Hongkong Observatory, has sent us a copy of his report on the work done during 1895. All the typhoons—about 250—observed since the observatory was established in 1884, have now been investigated, and Mr. Figg, in conjunction with Mr. Doberck, is at present engaged

in studying the laws of storms on the basis of these investigations. Meteorological observations are made at the Treaty Ports and transmitted to the observatory, and the hope is entertained that the number of ports from which such information is telegraphed will be greatly extended; for there is no meteorological service in China, and the data at present collected is insufficient.

THE Manchester Literary and Philosophical Society was founded so long ago as February 28, 1781, the number of original members being twenty-four. Some interest, therefore, attaches to the complete list, just issued, of the members and officers from the institution of the Society to April of this year. In the same publication are bibliographical lists of the manuscript volumes dealing with the affairs of the Society, and of the volumes of the *Memoirs* and *Proceedings* issued by the Society. There are also two appendices setting forth the original rules adopted and the objects of the meetings.

In looking through the *Transactions* lately received from three local scientific societies, the fact is brought to mind that practically all such societies are concerned with natural history, scarcely any attention being paid to physical science. In the *Transactions* of the Leicester Literary and Philosophical Society are papers on bacteria and their importance in nature, Coleoptera of Bradgate Park, and insects in relation to the fertilisation of flowers. The Natural History *Transactions* of Northumberland, Durham, and Newcastle-upon-Tyne—the publication of the Tyne-Side Naturalists' Field Club, founded fifty years ago—contains papers on Entomostraca collected in the Solway district and at Seaton Sluice, Northumberland, during 1894, a catalogue of the spiders of Northumberland and Durham, and the results of a systematic study of pollen. In the *Transactions* of the Norfolk and Norwich Naturalists' Society are several really valuable papers. The President, Mr. H. D. Geldart, devotes his address to the consideration of the distribution of flowering plants in the Arctic regions, and strives to show that the commonly accepted hypothesis of the migration to and fro of the Arctic flora with the greater or less intensity of cold is not consistent with facts, but that plants have held their own in their old localities in spite of the intense glaciation to which they have been subjected. Mr. Geldart is also associated with Colonel Feilden in two interesting papers on Arctic Botany. Among other papers are some instructive notes on the Flora of Great Yarmouth and its neighbourhood, by Mr. G. B. Harris; and Mr. Stacy Watson contributes an account of the herring fishery from that port and Lowestoft. Some observations on the rare New Zealand Owl, *Sceloglaux albifacies*, in captivity, with a figure, are contributed by Mr. J. H. Gurney, and Prof. Newton follows with a note on an early record of the breeding of the Spoonbill in Norfolk; while Mr. Miller Christy notes a reference to an occurrence of a Narwhal in the same county in the year 1588. A list of the Mollusca of Norfolk is given by Mr. Mayfield; Mr. Preston continues his long series of Meteorological Notes for the neighbourhood of Norwich; and Mr. Southwell describes interesting recent additions to the Norwich Castle Museum.

THE *Journal of the Asiatic Society of Bengal* (vol. lxx. part 2, 66) contains an investigation of the decomposition of aqueous solutions of sodium hypochlorite at the temperature of boiling water, by Jyotibhushan Bhaduri. It is of interest that solutions containing from 1.5 to 1.7 per cent. of the hypochlorite, decompose less rapidly than those of any other concentration. The decomposition results in the formation not only of sodium chlorate, but also of considerable quantities of free oxygen.

IN the current number of the *Comptes rendus* M. A. Leduc gives an account of some further experiments on the densities of oxygen and nitrogen, the repetition of the determinations of

the latter being necessitated by the discovery of argon. The nitrogen was prepared from four distinct sources (ammonium nitrate, ammonium nitrite, nitric oxide, and ammonia), every possible precaution being taken to ensure the purity of the gas. For the flask employed, all the weights of nitrogen found fell between 2.8467 grams and 2.8474 grams, the mean result corresponding to a relative density of 0.9671 (air=1). The experiments with the oxygen obtained by the electrolysis of potash solution were also repeated, greater precautions being taken to remove all traces of hydrogen, while, in a second set of experiments, oxygen obtained by the action of heat upon potassium permanganate was employed, the mean relative density being 1.10523, a slight increase on the earlier results. By taking the values found for the densities of chemical and atmospheric nitrogen, together with the results of M. Schloesing, jun., on the ratio of argon to nitrogen in atmospheric nitrogen, the value 19.8 is found for the density of argon compared with hydrogen. The close agreement between this and the value found directly (19.94), affords a useful check upon the results.

THE additions to the Zoological Society's Gardens during the past week include a Sykes's Monkey (*Cercopithecus albicollaris*, ♂) from West Africa, presented by Mrs. Gooding; a Squirrel Monkey (*Chrysotrrix sciurea*) from Guiana, presented by Mr. James W. Wells; a White-fronted Lemur (*Lemur albigrons*) from Madagascar, presented by Mr. Richard A. Todd; a Red-bellied Squirrel (*Sciurus variegatus*) from Mexico, presented by Mr. James Meldrum; a Vulpine Phalanger (*Trichosurus vulpecula*) from Australia, presented by Mr. George Turner; two Brown Mynahs (*Acridotheres fuscus*) from India, presented by Mr. H. Nowell; a Mute Swan (*Cygnus olor*), British, presented by Mr. J. Culling; a Hawk's-billed Turtle (*Chelone imbricata*) from tropical seas, deposited.

OUR ASTRONOMICAL COLUMN.

STARS WITH PECULIAR SPECTRA.—A recent examination of some of the Draper Memorial photographs, by Mrs. Fleming, has resulted in finding some interesting cases of peculiar spectra (*Harvard College Circular*, No. 12). The spectrum of $-39^{\circ}3939$ is described as very remarkable, and unlike any other as yet obtained. Three systems of lines cross the continuous spectrum. First the dark hydrogen lines and K, then two bright bands or lines at approximate wave-lengths 4652 and 4698. A third series has for the wave-lengths of its lines 3814, 3857, 3923, 4028, 4203, and 4505, the last being faint. These latter six lines form a rhythmical series similar to that of hydrogen, and "apparently are due to some element not yet found in other stars or on the earth." Balmer's formula was not capable of representing this series, but a modification of it gave the wave-lengths of the lines as 3812, 3858, 3928, 4031, 4199, and 4504. The only other line found in the spectrum was 4620, being apparently independent of the series just mentioned. The star R.A. (1900) 12h. 26.9m. Decl. $-57^{\circ}1'$ is a new variable in Crux. Its period is about a year, and its photographic magnitude is deduced as being 10.3 at maximum, and fainter than 13.2 at minimum N.G.C. 6302 was found on July 9, 1896, to contain the bright lines characteristic of gaseous nebulae. The stars designated $+44^{\circ}3649$ and $+44^{\circ}3679$ have similar spectra, containing two bright bands "resembling, and perhaps identical with, those in the spectrum of ζ Puppis." Miss Louisa D. Wells has found a new variable in Cygnus, its approximate position for 1900 being R.A. 21h. 38.8m. Decl. $+43^{\circ}8'$. It has a period of about forty days, and fluctuates between 7.2 and 11.2 photographic magnitudes. This range is somewhat considerable for such a short period variable.

THE LEONIDS.—From the account of the Leonid meteors given in the last number of NATURE, it would have been gathered that the shower was after all only a very ordinary one, the time of maximum being estimated as having occurred during the early part of the night of the 14th. An observer, who has written to the *Dumfries and Galloway Courier and Herald*